

Multiple Service Departments, Supply Chain Management, and Lean Manufacturing Notes

Introduction

This document provides comprehensive notes on **Multiple Service Department Cost Allocation**, **Supply Chain Management (SCM)**, and **Lean Manufacturing**, as relevant to the CMA (US) curriculum. These topics are critical for accurate cost allocation, operational efficiency, and strategic decision-making. The notes correct formatting errors, enhance clarity, and include an example problem integrating business combinations with service department cost allocation.

Multiple Service Department Cost Allocation

When a company has multiple service departments (e.g., maintenance, cafeteria) that support production departments, costs must be allocated appropriately. Three methods are commonly used: **Direct Method**, **Step Method**, and **Reciprocal Method**.

1. Direct Method

- **Overview:** Ignores services provided between service departments. Costs are allocated directly to production departments based on their usage of each service department's resources.
- **Allocation Base:** Typically labor hours, machine hours, or another relevant measure.
- **Advantages:** Simple and easy to implement.
- **Disadvantages:** Ignores inter-service department interactions, potentially leading to less accurate allocations.

Example (Cubs Co.):

- **Departments:** Two service departments (A: \$100,000, labor hours; B: \$50,000, machine hours) and three production departments (X, Y, Z).
- **Data:**
 - Dept. A: \$100,000, allocated based on labor hours (X: 2,000, Y: 4,000, Z: 3,000; Total: 9,000).
 - Dept. B: \$50,000, allocated based on machine hours (X: 2,000, Y: 2,000, Z: 2,000; Total: 6,000).
- **Allocation:**
 - Dept. A Rate: $\$100,000 / 9,000 = \$11.11/\text{hour}$
 - X: $2,000 \times \$11.11 = \$22,222$
 - Y: $4,000 \times \$11.11 = \$44,444$
 - Z: $3,000 \times \$11.11 = \$33,333$

- Dept. B Rate: $\$50,000 / 6,000 = \$8.33/\text{hour}$
 - X: $2,000 \times \$8.33 = \$16,667$
 - Y: $2,000 \times \$8.33 = \$16,667$
 - Z: $2,000 \times \$8.33 = \$16,667$

- **Total Overhead:**

- X: $\$200,000 + \$22,222 + \$16,667 = \$238,889$
- Y: $\$300,000 + \$44,444 + \$16,667 = \$361,111$
- Z: $\$250,000 + \$33,333 + \$16,667 = \$300,000$

2. Step Method

- **Overview:** Recognizes some services provided between service departments. Departments are allocated in a sequence, typically based on the percentage of services provided to other service departments.
- **Process:** Allocate one service department's costs first, including to other service departments, then allocate the next department's costs, and so on.
- **Advantages:** More accurate than the direct method by accounting for some inter-service interactions.
- **Disadvantages:** Still ignores reciprocal services after the first allocation.

Example (Cubs Co.):

- **Order:** Allocate Dept. A first (higher service to others), then Dept. B.
- **Data:**
 - Dept. A: \$100,000, labor hours (B: 1,000, X: 2,000, Y: 4,000, Z: 3,000; Total: 10,000).
 - Dept. B: \$50,000 + A's allocation, machine hours (X: 2,000, Y: 2,000, Z: 2,000; Total: 6,000).
- **Allocation:**
 - Dept. A Rate: $\$100,000 / 10,000 = \$10/\text{hour}$
 - B: $1,000 \times \$10 = \$10,000$
 - X: $2,000 \times \$10 = \$20,000$
 - Y: $4,000 \times \$10 = \$40,000$
 - Z: $3,000 \times \$10 = \$30,000$
 - Dept. B Total: $\$50,000 + \$10,000 = \$60,000$

- Dept. B Rate: $\$60,000 / 6,000 = \$10/\text{hour}$
 - X: $2,000 \times \$10 = \$20,000$
 - Y: $2,000 \times \$10 = \$20,000$
 - Z: $2,000 \times \$10 = \$20,000$

- **Total Overhead:**

- X: $\$200,000 + \$20,000 + \$20,000 = \$240,000$
- Y: $\$300,000 + \$40,000 + \$20,000 = \$360,000$
- Z: $\$250,000 + \$30,000 + \$20,000 = \$300,000$

3. Reciprocal Method

- **Overview:** Fully recognizes services provided between service departments using simultaneous equations to allocate costs.
- **Process:** Set up equations for each service department, solve for total costs, then allocate to production departments.
- **Advantages:** Most accurate, as it accounts for all inter-service interactions.
- **Disadvantages:** Complex, requiring mathematical solutions.

Example (Cubs Co.):

- **Data:**
 - Dept. A: \$100,000, 10% to B, 20% to X, 40% to Y, 30% to Z.
 - Dept. B: \$50,000, 25% to A, 25% to X, 25% to Y, 25% to Z.
- **Equations:**
 - $A = \$100,000 + 0.25B$
 - $B = \$50,000 + 0.10A$
- **Solve:**
 - Substitute $B = \$50,000 + 0.10A$ into A:
 - $A = \$100,000 + 0.25(\$50,000 + 0.10A)$
 - $A = \$100,000 + \$12,500 + 0.025A$
 - $0.975A = \$112,500$
 - $A = \$115,384.62$
 - Substitute A into B:
 - $B = \$50,000 + 0.10 \times \$115,384.62 = \$61,538.46$

- **Allocation:**

- Dept. A (\$115,384.62):
 - B: $0.25 \times \$115,384.62 = \$28,846.15$
 - X: $0.20 \times \$115,384.62 = \$23,076.92$
 - Y: $0.40 \times \$115,384.62 = \$46,153.85$
 - Z: $0.30 \times \$115,384.62 = \$34,615.38$
- Dept. B (\$61,538.46):
 - A: $0.10 \times \$61,538.46 = \$6,153.85$
 - X: $0.25 \times \$61,538.46 = \$15,384.62$
 - Y: $0.25 \times \$61,538.46 = \$15,384.62$
 - Z: $0.25 \times \$61,538.46 = \$15,384.62$

- **Total Overhead:**

- X: $\$200,000 + \$23,076.92 + \$15,384.62 = \$238,461.54$
- Y: $\$300,000 + \$46,153.85 + \$15,384.62 = \$361,538.47$
- Z: $\$250,000 + \$34,615.38 + \$15,384.62 = \$300,000$

Comparison:

- Direct: X: \$238,889, Y: \$361,111, Z: \$300,000
- Step: X: \$240,000, Y: \$360,000, Z: \$300,000
- Reciprocal: X: \$238,462, Y: \$361,538, Z: \$300,000
- **Analysis:** The reciprocal method is most accurate but complex; the direct method is simplest but least accurate.

Supply Chain Management (SCM)

Overview

Supply Chain Management (SCM) involves coordinating activities across product development, sourcing, production, logistics, and information systems to maximize customer value and achieve a competitive advantage.

- **Links in the Supply Chain:**

- **Physical Flows:** Movement of raw materials, components, and finished goods.
- **Information Flows:** Data sharing for demand forecasting, inventory management, and order tracking.

- **Goals:**
 - Reduce stockouts at retail.
 - Minimize excess manufacturing and inventory.
 - Decrease rush or expedited orders.

Example: A retailer collaborates with suppliers and logistics providers to ensure timely restocking, reducing stockouts and excess inventory costs.

Lean Manufacturing

Overview

Lean Manufacturing focuses on eliminating waste in the manufacturing process to deliver customer value efficiently. Waste is defined as anything beyond the minimum resources (equipment, materials, time) needed to add value.

Goals

- Streamline operations to deliver products at the lowest cost and shortest lead time.
- Meet customer demand with minimal inventory and defects.

Seven Wasteful Activities

1. **Overproduction:** Producing more than needed.
2. **Waiting:** Idle time due to delays or bottlenecks.
3. **Transportation:** Unnecessary movement of materials.
4. **Overprocessing:** Excessive processing beyond customer requirements.
5. **Inventory:** Excess raw materials, work-in-process, or finished goods.
6. **Motion:** Unnecessary movement by workers.
7. **Defects:** Rework or scrap due to quality issues.

Five Lean Principles

1. **Define Value:** Understand what customers value.
2. **Map the Value Stream:** Identify all steps in the production process, eliminating non-value-adding activities.
3. **Create Flow:** Ensure smooth production without interruptions.
4. **Establish Pull:** Produce only what is demanded by customers.
5. **Pursue Perfection:** Continuously improve processes.

Key Features

- **Minimal Machine Downtime:** Efficient changeovers to reduce setup times, enabling smaller batch sizes.
- **Manufacturing Cells:** Organize the plant into work cells dedicated to specific products or product types, improving flow and efficiency.
- **Kaizen (Continuous Improvement):** Incremental improvements to processes, quality, and efficiency.

Benefits

- Improved quality with fewer defects and rework.
- Reduced machine and process breakdowns.
- Lower inventory levels and faster delivery times.

Example: A car manufacturer adopts lean principles by using manufacturing cells to assemble specific models, reducing setup times and inventory, resulting in faster production and fewer defects.

Example Problem: Business Combination and Service Department Allocation

Scenario: A parent company acquires a subsidiary with two service departments (IT: \$150,000, allocated by labor hours; HR: \$80,000, allocated by headcount) and two production departments (P1, P2). Post-acquisition, IT fixed costs increase by 10% due to fair value adjustments. Allocate costs using the reciprocal method and compare with the direct method.

Data:

- IT: \$150,000 (10% to HR, 40% to P1, 50% to P2; Total labor hours: 10,000).
- HR: \$80,000 (20% to IT, 30% to P1, 50% to P2; Total headcount: 200).
- P1: 4,000 labor hours, 60 headcount.
- P2: 5,000 labor hours, 100 headcount.
- Post-acquisition IT cost: $\$150,000 \times 1.1 = \$165,000$.

Reciprocal Method:

- **Equations:**
 - $IT = \$165,000 + 0.20HR$
 - $HR = \$80,000 + 0.10IT$
- **Solve:**
 - $HR = \$80,000 + 0.10(IT)$

- $IT = \$165,000 + 0.20(\$80,000 + 0.10IT)$
- $IT = \$165,000 + \$16,000 + 0.02IT$
- $0.98IT = \$181,000$
- $IT = \$184,693.88$
- $HR = \$80,000 + 0.10 \times \$184,693.88 = \$98,469.39$

- **Allocation:**

- IT (\$184,693.88):
 - $HR: 0.20 \times \$184,693.88 = \$36,938.78$
 - $P1: 0.40 \times \$184,693.88 = \$73,877.55$
 - $P2: 0.50 \times \$184,693.88 = \$92,346.94$
- HR (\$98,469.39):
 - $IT: 0.10 \times \$98,469.39 = \$9,846.94$
 - $P1: 0.30 \times \$98,469.39 = \$29,540.82$
 - $P2: 0.50 \times \$98,469.39 = \$49,234.70$

- **Total Overhead:**

- $P1: \$73,877.55 + \$29,540.82 = \$103,418.37$
- $P2: \$92,346.94 + \$49,234.70 = \$141,581.64$

Direct Method:

- IT Rate: $\$165,000 / (4,000 + 5,000) = \$18.33/\text{hour}$
 - $P1: 4,000 \times \$18.33 = \$73,320$
 - $P2: 5,000 \times \$18.33 = \$91,650$
- HR Rate: $\$80,000 / (60 + 100) = \$500/\text{head}$
 - $P1: 60 \times \$500 = \$30,000$
 - $P2: 100 \times \$500 = \$50,000$
- **Total Overhead:**
 - $P1: \$73,320 + \$30,000 = \$103,320$
 - $P2: \$91,650 + \$50,000 = \$141,650$

Analysis: The reciprocal method accounts for inter-service interactions, providing a more accurate allocation. In a business combination, the parent must align allocation methods

across subsidiaries to ensure consistent consolidated financial reporting, adjusting for fair value impacts.

Summary

- **Multiple Service Department Allocation:**
 - **Direct Method:** Simple but ignores inter-service interactions.
 - **Step Method:** Accounts for some inter-service interactions, less complex than reciprocal.
 - **Reciprocal Method:** Most accurate, using simultaneous equations to capture all interactions.
- **Supply Chain Management:** Coordinates activities to reduce stockouts, excess inventory, and costs while maximizing customer value.
- **Lean Manufacturing:** Eliminates waste, improves quality, and enhances efficiency through principles like Kaizen and manufacturing cells.
- **Business Combinations:** Require standardized allocation methods and adjustments for fair value to ensure accurate cost allocation in consolidated financial statements.